



PATENT  
Customer No. 22,852  
Attorney Docket No. 05225.0211

THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Shogo HACHIYA

Application No.: 09/963,640

Filed: September 27, 2001

For: CIRCUIT BOARD FOR  
TRANSMITTING SIGNALS,  
METHOD FOR PRODUCING THE  
SAME, AND ELECTRONIC  
DEVICE HAVING THE SAME

Commissioner for Patents  
Washington, DC 20231

Sir:

AMENDMENT

In reply to the Office Action dated May 8, 2002, please amend the application as follows:

IN THE CLAIMS:

Please amend claims 1-5, 8-12, and 14, as follows:

1. (Amended) A circuit board for transmitting signals, comprising:  
a dielectric layer;  
a signal line configured as a pattern on the dielectric layer to transmit the signals;

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a pad formed on the dielectric layer, the pattern connected to and extending away from the pad;

a ground/power supply layer formed under the dielectric layer and having a rectangular hole below the pad,

wherein a longitudinal length of the rectangular hole extends in a direction substantially parallel with a direction of the pattern extending away from the pad and the longitudinal length of the rectangular hole may be adjustable along a longitudinal length of the pad.

2. (Amended) The circuit board of claim 1, wherein:

the rectangular hole is formed outside an imaginary line extending the pattern.

3. (Amended) The circuit board of claim 1, wherein:

the rectangular hole has a width wider than that of the pattern and narrower than that of the pad.

4. (Amended) The circuit board of claim 1, wherein:

the rectangular hole comprises a pair of rectangular holes formed below the pad and outside imaginary lines extending the pattern and a third rectangular hole formed between the imaginary lines.

5. (Amended) The circuit board of claim 1, wherein:

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the rectangular hole comprises a pair of rectangular holes formed below the pad outside imaginary lines extending the pattern.

8. (Amended) The circuit board of claim 1, wherein:

the rectangular hole is formed between imaginary lines extending the pattern.

9. (Amended) A method for producing a circuit board for transmitting signals, comprising:

forming a dielectric layer;

forming a signal line configured as a pattern on the dielectric layer to transmit the signals;

forming a pad on the dielectric layer and connected to the pattern; and

forming a ground/power supply layer under the dielectric layer including a rectangular hole below the pad, wherein a longitudinal length of the rectangular hole extends in a direction substantially parallel with a direction of the pattern extending away from the pad and the longitudinal length of the rectangular hole may be adjustable along a longitudinal length of the pad.

10. (Amended) The method of claim 9, wherein forming the ground/power supply layer includes:

forming the rectangular hole outside an imaginary line extending the pattern.

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11. (Amended) The method of claim 9, wherein forming the ground/power supply layer includes:

forming the rectangular hole to have a width wider than that of the pattern and narrower than that of the pad.

12. (Amended) The method of claim 9, wherein forming the ground/power supply layer includes:

forming the rectangular hole as a pair of rectangular holes below the pad outside imaginary lines extending the pattern and a third rectangular hole formed between the imaginary lines.

*A3*

14. (Amended) The method of claim 9, wherein forming the ground/power supply layer includes:

forming the rectangular hole between imaginary lines extending the pattern.

#### REMARKS

By the present Amendment, Applicant has amended claims 1-5, 8-12, and 14 to more appropriately define the invention. Claims 1-23 are pending.

In the Office Action, the Examiner rejected claims 1, 2, 9, 10, 15, 16, and 19 under 35 U.S.C. § 102(b) as anticipated by JP Patent Publication No. 06-260773 of Yoshiyuki et al. (hereinafter, "JP '773); and rejected claims 3-8, 11-14, 17, 18, and 20-23 under 35 U.S.C. § 103(a) as unpatentable over JP '773 in view of U.S. Patent No. 6,184,478 of Imano et al. (hereinafter, "US '478). Applicant respectfully traverses these rejections for the following reasons.

### Response to 35 U.S.C. § 102(b) Rejection

In the rejection, the Examiner contends that JP '773 anticipates the claimed invention. The Examiner alleges that JP '773, in Figure 1, discloses a circuit board comprising a dielectric layer 23a, a signal line 21 configured as a pattern, a pad 24, the pattern connected to and extending away from pad 24, ground/power supply layer 22a formed under the dielectric layer having a hole 25 below the pad. The Examiner further alleges that JP '773 discloses hole 25 extends in a direction substantially parallel with a direction of the pattern extending away from the pad 24. Nevertheless, Applicant respectfully asserts that JP '773 fails to anticipate the claimed invention for the following reasons.

In order to properly anticipate Applicant's claimed invention under 35 U.S.C. § 102(b), each and every element of the claim in issue must be found, either expressly described or under principles of inherency, in a single prior art reference. Furthermore, "[t]he identical invention must be shown in as complete detail as is contained in the ... claim." See M.P.E.P. § 2131 (8<sup>th</sup> Ed., Aug. 2001), quoting *Richardson v. Suzuki Motor Co.*, 868 F.2d 1126, 1236, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989). Finally, "[t]he elements must be arranged as required by the claim." M.P.E.P. § 2131 (8<sup>th</sup> Ed. 2001), p. 2100-69.

Claim 1 of the present invention is directed to a circuit board comprising a combination of elements including, *inter alia*, "a ground/power supply layer formed under [a] dielectric layer and having a rectangular hole below [a] pad, wherein a longitudinal length of the rectangular hole extends in a direction substantially parallel with a direction of [a] pattern extending away from the pad and the longitudinal length of

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the rectangular hole may be adjustable along a longitudinal length of the pad." Claim 15 is directed to an electronic device having similar recitations.

JP '773 is directed to a circuit board with a pad structure. As alleged by the Examiner, JP '773 discloses a pad 24 and wiring pattern 21 formed on a dielectric layer 23a and a ground/power supply layer 22a formed under dielectric layer 23a having a cut portion 25. JP '773, however, does not teach that a longitudinal length of cut portion 25 extends in a direction substantially parallel with a direction of the wiring pattern. In fact, JP '773 teaches that the longitudinal length of cut portion 25 is perpendicular to the direction of the wiring pattern. JP '773, at lines 9-13 of the abstract, recites "cut portion 25 of the ground/power supply plane layer 22a is formed small in the direction where a wiring of the pad 24 is led and is formed a little larger in the direction other than that where a wiring of a pad 24 is led." See also JP '773, Figure 4. Because the longitudinal length of cut portion 25 is shorter than that of pad 26, an impedance mismatch arises in the circuit board disclosed in JP '773 at the boundary between cut portion 25 and the area below pad 24.

In contrast, the present invention discloses that the area of the hole may be adjusted to allow impedance matching. Thus, JP '773 does not teach, expressly or inherently, at least "a ground/power supply layer formed under [a] dielectric layer and having a rectangular hole below [a] pad, wherein a longitudinal length of the rectangular hole extends in a direction substantially parallel with a direction of [a] pattern extending away from the pad and the longitudinal length of the rectangular hole may be adjustable along a longitudinal length of the pad." Therefore, JP '773 does not anticipate claims 1 and 15. For at least this reason, claims 1 and 15 are allowable. Claim 2 is allowable at

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least due to its dependence from allowable claim 1. Claims 16 and 19 are allowable at least due to their dependence from allowable claim 15.

Claim 9 is directed to a method for producing a circuit board comprising a combination of elements including, *inter alia*, "forming a ground/power supply layer under [a] dielectric layer including a rectangular hole below [a] pad, wherein a longitudinal length of the rectangular hole extends in a direction substantially parallel with a direction of [a] pattern extending away from the pad and the longitudinal length of the rectangular hole may be adjustable along a longitudinal length of the pad." As stated above, JP '773 does not teach a circuit board comprising a cut portion having a longitudinal length parallel with a direction of a wiring pattern. JP '773 also fails to teach forming a circuit board having such a cut portion. Thus, JP '773 does not anticipate claim 9 . For at least this reason, claim 9 is allowable.

Claim 10 is allowable at least due to its dependence from allowable claim 9.

#### Response to 35 U.S.C. § 103(a) Rejections

In the rejection, the Examiner contends claims 3-8, 11-14, 17, 18, and 20-23 are unpatentable over JP '773 and US '478. The Examiner alleges JP '773 discloses the claimed invention except that JP '773 does not disclose the configurations of the hole. The Examiner alleges that US '478 teaches varying the size and placement of holes in a ground/power layer. The Examiner alleges that it would have been obvious to make a modification to the invention of JP '773 as taught by US '478 because such modification could have been made to control impedance of the device. Nevertheless, Applicant respectfully submits that a *prima facie* case of obviousness has not been established for the following reasons.

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In order to establish a *prima facie* case of obviousness, three basic criteria must be met. First, the prior art reference (or references when combined) must teach or suggest all the claim elements. Furthermore, "[a]ll words in a claim must be considered in judging the patentability of that claim against the prior art." See M.P.E.P. § 2143.01 (8<sup>th</sup> Ed., Aug. 2001), quoting *In re Wilson*, 424 F.2d 1382, 1385, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970).

Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify a reference or to combine reference teachings. Finally, there must be a reasonable expectation of success. See M.P.E.P. § 2143 (8<sup>th</sup> Ed. 2001), pp. 2100-122 to 127. In this case, a *prima facie* case of obviousness has not been established because JP '773 and US '478 do not teach or suggest all the claim elements.

Claims 3-8, 11-14, and 17, 18, and 20-23 depend from claims 1, 9, and 15, respectively, and therefore incorporate the elements of those claims. As advanced above in response to the § 102(a) rejection, JP '773 does not teach or suggest at least a ground/power supply layer formed under a dielectric layer and having a rectangular hole below a pad, wherein a longitudinal length of the rectangular hole extends in a direction substantially parallel with a direction of a pattern extending away from the pad. The Examiner does not rely on US '478 to teach or suggest this claim element, and in fact, US '478 fails to teach or suggest this claim element. US '478 merely teaches forming a number of holes 12 in a grounding layer 11. US '478, however, does not teach holes 12 are formed under a pad. See US '478, Figure 3a and col. 3, lines 13-52. Thus, US '478 also does not teach or suggest at least a ground/power supply layer

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formed under a dielectric layer and having a rectangular hole below a pad, wherein a longitudinal length of the rectangular hole extends in a direction substantially parallel with a direction of a pattern extending away from the pad.

Since JP '773 and US '478, taken alone or in combination, fail to teach or suggest all the elements of the claims, a *prima facie* of obviousness has not been established for claims 3-8, 11-14, 17, 18, and 20-23. For at least this reason, claims 3-8, 11-14, 17, 18, and 20-23 are allowable.

In view of the foregoing, Applicant respectfully requests the reconsideration and reexamination of this application and the timely allowance of the pending claims.

Attached hereto is a marked-up version of the changes made to the claims by this Amendment. The attachment is captioned "Appendix to Amendment of August 7, 2002".

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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Dated: August 7, 2002

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